AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently Amended) A ~~computer-implemented~~ method <u>implemented by a computing device comprising at least one processor and memory</u> for grayscale registration of a first medical image and a second medical image, <u>the method</u> comprising ~~the computer-implemented steps of~~:

spatially registering<u>, by the computing device,</u> the first medical image and the second medical image relative to each other;

generating<u>, by the computing device,</u> at least one joint pixel value histogram based on pixel values of the first and second medical images;

generating<u>, by the computing device,</u> a lookup table based at least in part on the at least one joint pixel value histogram, a first image acquisition method for the first medical image and a second image acquisition method for the second medical image; and

applying<u>, by the computing device,</u> the lookup table to the pixel values of the first medical image to generate a third medical image, the third medical image being transformed from the first medical image and registered to the second medical image;

wherein the step of generating the lookup table includes:

selecting a parametric transform function from a plurality of predetermined, parametric transform functions based on the first and second medical image acquisition methods for the first and second medical images, respectively; and

statistically fitting parameters of the selected parametric

transform function to the at least one pixel value histogram, the

statistically fitting determines values of the parameters, wherein the

lookup table is generated using the selected parametric transform

function and the values of the fitted parameters;

and wherein each of the first and second medical images is one of a

digitized analog image and a digitally acquired image and wherein the plurality of

predetermined parametric transform functions includes: (1) a function for registering a

digitized analog image to another digitized analog image, (2) a function for registering a

digitally acquired image to another digitally acquired image, (3) a function for registering

a digitally acquired image to a digitized analog image, and (4) a function for registering

a digitized analog image to a digitally acquired image.

2.   Canceled.

3.   Canceled.

4.   (Previously Presented) The method of claim 1, wherein the plurality of

predetermined parametric transform functions are one-dimensional monotonic

functions.

5.   Canceled.

6.   (Previously Presented) The method of claim 1, wherein each of the plurality

of predetermined parametric transform functions models image acquisition parameters,

the image acquisition parameters being at least one of incident radiation intensity,

exposure time, film characteristic curve for an analog image, digitizer characteristic for

digitizing an analog image, and digital detector response for a digitally acquired image.

7.   (Previously Presented) The method of claim 1, wherein each of the first and second medical images is a mammogram, and wherein each of the plurality of predetermined parametric transform functions models image acquisition parameters, the image acquisition parameters being at least one of breast thickness, incident radiation intensity, exposure time, film characteristic curve for an analog image, digitizer characteristic for digitizing an analog image, and digital detector response for a digitally acquired image.

8.   (Original) The method of claim 1, further comprising the steps of:
        performing computer aided detection process for comparing the second and third medical images; and
        displaying the second and third medical images with results of said computer aided detection process.

9.   (Original) The method of claim 1, wherein spatially registering the first and second medical images includes at least one of translating, rotating, shearing and scaling at least one of the first and second medical images.

10.   (Original) The method of claim 1, wherein each of the first and second medical images includes a target portion and a remainder portion and wherein spatially registering the first and second medical images includes segmenting the target portion and the remainder portion of each of the first and second medical images.

11.   (Original) The method of claim 1, wherein each of the first and second medical images includes a target portion and a remainder portion and wherein spatially registering the first and second medical images includes cropping each of the first and second medical images to contain only the target portion that is in both the first and second medical images.

12.   (Original) The method of claim 11, wherein the at least one pixel value histogram is generated based on pixel values of only the cropped first and second medical images.

13.   (Original) The method of claim 1, wherein spatially registering the first and second medical images includes optimization of an entropy correlation coefficient of the first and second medical images.

14.   (Currently Amended) A ~~computer-implemented~~ method <u>implemented by a computing device comprising at least one processor and memory</u> for registering a first medical image to a second medical image, <u>the method</u> comprising ~~the computer-implemented steps of~~:

generating<u>, by the computing device,</u> a joint pixel value histogram using pixel values of the first and second medical images;

selecting<u>, by the computing device,</u> a parametric transform function from a plurality of predetermined parametric transform functions, the selecting being based on a first medical image acquisition method for the first medical image and a second medical image acquisition method for the second medical image; and

statistically fitting<u>, by the computing device,</u> parameters of the selected parametric transform function to the joint pixel value histogram, the statistically fitting ~~determines~~ <u>determining</u> values of the parameters;

wherein each of the first and second medical images is one of a digitized analog image and a digitally acquired image and wherein the plurality of predetermined parametric transform functions includes: (1) a function for registering a digitized analog image to another digitized analog image, (2) a function for registering a digitally acquired image to another digitally acquired image, (3) a function for registering a digitally acquired image to a digitized analog image, and (4) a function for registering a digitized analog image to a digitally acquired image.

15. (Original) The method of claim 14, further comprising:

generating a lookup table using the selected parametric transform function and the values of the fitted parameters; and

applying the lookup table to the pixel values of the first medical image to generate a third medical image, the third medical image being transformed from the first medical image and registered to the second medical image.

16. (Original) The method of claim 14, further comprising the steps of:

performing computer aided detection process for comparing the second and third medical images; and

displaying the second and third medical images with results of said computer aided detection process.

17. (Original) The method of claim 14, wherein the plurality of predetermined parametric transform functions are one-dimensional monotonic functions.

18. Canceled.

19. (Original) The method of claim 14, wherein each of the plurality of predetermined parametric transform functions models image acquisition parameters, the image acquisition parameters being at least one of incident radiation intensity, exposure time, film characteristic curve for an analog image, digitizer characteristic for digitizing an analog image, and digital detector response for a digitally acquired image.

20.   (Original) The method of claim 14, wherein each of the first and second medical images is a mammogram, and wherein each of the plurality of predetermined parametric transform functions models image acquisition parameters, the image acquisition parameters being at least one of breast thickness, incident radiation intensity, exposure time, film characteristic curve for an analog image, digitizer characteristic for digitizing an analog image, and digital detector response for a digitally acquired image.

21.   (Original) The method of claim 14, further comprising spatially registering the first medical image and the second medical image relative to each other.

22.   (Original) The method of claim 21, wherein spatially registering the first and second medical images includes at least one of translating, rotating, shearing and scaling at least one of the first and second medical images.

23.   (Original) The method of claim 21, wherein each of the first and second medical images includes a target portion and a remainder portion and wherein spatially registering the first and second medical images includes segmenting the target portion and the remainder portion of each of the first and second medical images.

24.   (Original) The method of claim 21, wherein each of the first and second medical images includes a target portion and a remainder portion and wherein spatially registering the first and second medical images includes cropping each of the first and second medical images to contain only the target portion that is in both the first and second medical images.

25.   (Original) The method of claim 24, wherein the joint pixel value histogram is genera ted based on pixel values of only the cropped first and second medical images.

26.   (Original) The method of claim 21, wherein spatially registering the first and second medical images includes optimization of an entropy correlation coefficient of the medical images.

27.   (Currently Amended) A system for registering a first medical image to a second medical image, comprising:

an input for receiving data for the first and second medical images; and

a processor ~~configured to generate~~ generating a joint pixel value histogram using pixel values of the first and second medical images, select~~ing~~ a parametric transform function from a plurality of predetermined parametric transform functions based on a first image acquisition method for the first medical image and a second image acquisition method for the second medical image, and statistically fit~~ting~~ parameters of the selected parametric transform function to the joint histogram to determine the values of the parameters;

wherein each of the first and second medical images is one of a digitized analog image and a digitally acquired image, and wherein the plurality of predetermined parametric transform functions includes: (1) a function for registering a digitized analog image to another digitized analog image, (2) a function for registering a digitally acquired image to another digitally acquired image, (3) a function for registering a digitally acquired image to a digitized analog image, and (4) a function for registering a digitized analog image to a digitally acquired image.

28.   (Currently Amended) The system of claim 27, ~~wherein~~ the processor ~~is~~ further ~~configured to generate~~ generating a lookup table using the selected parametric transform function and the values of the fitted parameters and [[to]] apply~~ing~~ the lookup table to the pixel values of the first medical image to generate a third medical image, the third medical image being transformed from the first medical image and registered to the second medical image.

29. (Currently Amended) The system of claim 27, ~~wherein~~ the processor ~~is~~ further ~~configured to~~ perform<u>ing</u> a computer aided detection process for comparing the second and third medical images, the system further comprising:

a display for displaying the second and third medical images with results of the computer aided detection process.

30. (Original) The system of claim 27, wherein the plurality of predetermined parametric transform functions are one-dimensional monotonic functions.

31. Canceled.

32. (Original) The system of claim 27, wherein each of the plurality of predetermined parametric transform functions models image acquisition parameters, the image acquisition parameters being at least one of incident radiation intensity, exposure time, film characteristic curve for an analog image, digitizer characteristic for digitizing an analog image, and digital detector response for a digitally acquired image.

33. (Currently Amended) The system of claim 27, ~~wherein~~ the processor ~~is~~ further ~~configured to~~ spatially register<u>ing</u> the first medical image and the second medical image relative to each other.

34. (Currently Amended) The system of claim 33, ~~wherein~~ the processor ~~is~~ further ~~configured to~~ spatially register<u>ing</u> the first and second medical images by at least one of translating, rotating, shearing and scaling at least one of the first and second medical images.

35.   (Original) The system of claim 33, wherein each of the first and second medical image includes a target portion and a remainder portion and wherein the processor spatially registers the first and second medical images by segmenting the target portion and the remainder portion of each of the first and second medical images.

36.   (Currently Amended) The system of claim 33, wherein each of the first and second medical images includes a target portion and a remainder portion and wherein the processor ~~is~~ further ~~configured to~~ crops each of the first and second medical images to contain only the target portion that is in both the first and second medical images.

37.   (Currently Amended) The system of claim 36, ~~wherein~~ the processor ~~is~~ further ~~configured to generated~~ generating the joint pixel value histogram based on pixel values of only the cropped first and second medical images.

38.   (Currently Amended) The system of claim 33, ~~wherein~~ the processor ~~is~~ further ~~configured to~~ spatially registering the first and second medical images by optimizing an entropy correlation coefficient of the first and second medical images.

39.   (Currently Amended) A tangible computer readable storage medium embodied with a computer program product such that when executed directs a computing apparatus to automatically register a first medical image and a second medical image, comprising:

computer code for generating a joint pixel value histogram using pixel values of the first and second medical images;

computer code for selecting a parametric transform function from a plurality of predetermined parametric transform functions, the selecting being based on a first image acquisition method for the first medical image and a second image acquisition method for the second medical image; and

computer code for statistically fitting parameters of the selected parametric transform function to the joint pixel value histogram, the statistically fitting determines values of the parameters, wherein each of the first and second medical images is one of a digitized analog image and a digitally acquired image and wherein the plurality of predetermined parametric transform functions includes: (1) a function for registering a digitized analog image to another digitized analog image, (2) a function for registering a digitally acquired image to another digitally acquired image, (3) a function for registering a digitally acquired image to a digitized analog image, and (4) a function for registering a digitized analog image to a digitally acquired image.

40.   (Currently Amended) A tangible computer readable storage medium embodied with a_computer program product such that when executed directs a computing apparatus to automatically register a first medical image and a second medical image, comprising:

computer code for spatially registering the first medical image and the second medical image relative to each other;

computer code for generating at least one joint pixel value histogram based on pixel values of the first and second medical images;

computer code for generating a lookup table based on the at least one joint pixel value histogram, a first image acquisition method for the first medical image and a second image acquisition method for the second medical image; and
computer code for applying the lookup table to the pixel values of the first medical image to generate a third medical image, the third medical image being transformed from the first medical image and registered to the second medical image;

wherein the computer code for generating the lookup table includes:

computer code for selecting a parametric transform function from a plurality of predetermined, parametric transform functions based on the first and second medical image acquisition methods for the first and second medical images, respectively; and

computer code for statistically fitting parameters of the

selected parametric transform function to the at least one pixel

value histogram, the statistically fitting determines values of the

parameters, wherein the lookup table is generated using the

selected parametric transform function and the values of the fitted

parameters;

wherein each of the first and second medical images is one of a digitized

analog image and a digitally acquired image, and wherein the plurality of predetermined

parametric transform functions includes: (1) a function for registering a digitized analog

image to another digitized analog image, (2) a function for registering a digitally

acquired image to another digitally acquired image, (3) a function for registering a

digitally acquired image to a digitized analog image, and (4) a function for registering a

digitized analog image to a digitally acquired image.